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09/849,460	05/04/2001	Teng-Tang Yang	JCLA6212	8342

7590

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EXAMINER

YEVSNIKOV, VICTOR V

ART UNIT

PAPER NUMBER

2825

DATE MAILED: 05/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application N .

09/849,460

Applicant(s)

YANG ET AL.

Examiner

Victor Yevsikov

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2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 12-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9, 10 and 12-15 is/are rejected.
- 7) ☒ Claim(s) 8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

#### Statutory Basis

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

#### The Rejections

Claims 1-4, 7, 12-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Akram et al..

Akram discloses a method of making a conductive structure via a photolithographic and etching steps as described in column 3, lines 40-60, (Claims 1 and 12) comprising: forming a substrate 38, a processed barrier layer 50a formed "on" the substrate, a pre in-situ metal layer 50b, and a first metal layer 50c which is formed after the pre in-situ layer and in the same vacuum. The barrier layer 50a and first metal layer 50c can be titanium nitride and tungsten, respectively. (claims 3 and 7, 15, see lines 23-38 of column 4) Further, the layer 50b is a mixture and can be TiN or TiW as detailed at the same location in column 4. (claims 2, 14) As to the issue of processing, the Akram reference discloses from column 4, line 64 to column 5, line 28, the manner of forming the graded layers wherein they are formed in the same chamber without

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breaking vacuum. (Claims 1, 4, 12, and 13) For these reasons, the claimed subject matter is viewed as anticipated by Akram et al.

### ***Claim Rejections - 35 USC § 103***

#### **Statutory Basis**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

#### **The Rejections**

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al..

Akram teaches the above features but lacks an explicit disclosure of: processing the barrier layer in high temperature or cooling in the environment of formation; wherein the barrier layer can be composed of a plurality of metal layers and the explicit recitation of an antireflective material as element 53. The drawings of Akram depict only a single barrier layer 50a as opposed to a plurality of barrier layers; however, the passage in column 4, lines 11-38, details that the layer 50 can be composed of a plurality of layers and is not limited to 3. ("Layer 50 may be made of a number of discrete sub-layers.") Consequently, this would suggest that an additional layer can be incorporated into the depicted drawings with the layer 50a and thus the barrier layer can be composed of multilayers, which satisfy the transition from TiN to W. (Claim 5) Additionally, in the

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sputtering and CVD processes of formation, the device created is subjected to a cooling in the air when the gases are purged at the end of the sputtering or the CVD process is complete. By so doing, the operator would prevent unwanted contamination of further areas of the device when the wafer is moved to the next process chamber. (Claim 6)

Therefore, it would have been obvious to one of ordinary skill in the art to allow the wafer formed in the process as outlined in Akram to cool in the atmosphere until all the forming gases are purged so as to prevent the unwanted deposition of the material in other areas of the device. Further, it would have been obvious to incorporate a plurality of layers for the barrier layer 50a as Akram suggests such as a means for supplying a good transition from the layer of 50a to the layer to 50c.

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. in view of Tanabe et al. and Kwon et al..

Akram discloses the features outlined above but as to claims 9 and 10, the layer 53 is indicated as a nitride and is an insulative layer. Therefore, the function of layer 53 is not specified and the type of nitride is not specified. However, it is notoriously well known to one of ordinary skill in the art, of which the examiner takes Official Notice, to use nitrides such as titanium nitride and silicon nitride as anti-reflective materials whereby the photolithographic formation of the gate stack is improved or made with more precision. In support of this assertion, the examiner cites Tanabe and Kwon wherein in Tanabe, the layer 13 is a silicon nitride and is used as a means for improved precision in gate formation; and Kwon discloses that titanium nitride is a well known antireflective material. Therefore, it would have been obvious to have the nitride layer

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53 of Akram be titanium nitride and function as an antireflective material in order to provide a more precision defined gate structure.

#### Status of the Remaining Claims

Claim 8 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

This claim recite limitations as to a dielectric layer playing a role in the formation of the conductive structure which is not shown in the prior art.

#### Response to Comments

The examiner finds applicant's comments persuasive as to the reading of Dixit and the incorporation of the previously objected to subject matter into the claims. However, upon updating search and reviewing the prior art, the examiner found a new reference which reads upon applicant's claims. Consequently, the rejections contained herein are not to be considered a final rejection of the claims.

#### Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor Yevsikov whose telephone number is 703-305-0129. The examiner can normally be reached on Monday-Thursdays 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 703-308-1323. The fax phone numbers for the organization where this application or proceeding is assigned are 703-

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305-3431 for regular communications and 703-305-3431 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1373.

Victor Yevsikov  
Examiner  
Art Unit 2825

Mss/vy  
May 12, 2003

A handwritten signature in black ink, appearing to read 'M. Smith'.

MATTHEW SMITH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800